JOURNAL OF THEORETICAL BIOLOGY

Chief Editor: J. F. DANIELLI Associate Editor: L. WOLPERT Assistant Editor: D. GINGELL

Editorial Board:

E. A. BARNARD

H. Bremermann

M. CALVIN

J. D. COWAN

D. A. GLASER

B. GOODWIN

J. J. B. JACK

J. MAYNARD SMITH

D. MAZIA

B. C. PATTEN

C. H. WADDINGTON

M. YČAS

J. Z. Young

VOLUME 35

April to June 1972



ACADEMIC PRESS
London and New York

Copyright © 1972, by Academic Press Inc. (London) Ltd.

ALL RIGHTS RESERVED

No part of this volume may be reproduced in any form, by photostat, microfilm, or any other means, without written permission from the publishers.

Contents of Volume 35

Number 1, April 1972

ALEXANDROV, V. Ya., The Problem of Behaviour at the Cellular Level (Cytoethology)	1
MARKOWITZ, D., Co-operativity Model of Cellular Control: Organization and Complexity	27
DOETSCH, R. N., A Unified Theory of Bacterial Motile Behavior .	55
SHULER, M. L., ARIS, R. and TSUCHIYA, H. M., Diffusive and Electrostatic Effects with Insolubilized Enzymes	67
Kuhn, J. and Parag, Y., Protein-subunit Aggregation Model for Self-incompatability in Higher Fungi (Schizophyllum commune) .	77
SMYTHIES, J. R., Molecular Mechanisms of Adrenergic Receptors .	93
GREEN, H. S. and CASLEY-SMITH, J.R., Calculations on the Passage of Small Vesicles across Endothelial Cells by Brownian Motion .	103
NEAL, J. L., Analysis of Michaelis Kinetics for Two Independent, Saturable Membrane Transport Functions	113
SEYMOUR, R. S., Convective Heat Transfer in the Respiratory Systems of Panting Animals	119
Neville, M. C., Kelman, R. B. and Briese, F. W., Monte Carlo Simulation of Co-operative Adsorption of Ligands onto Polymers	129
LAURIA, F. E., Mathematical Approach to the Study of the Cerebral Cortex IV. The Spread of Excitation in the Space and Time Domains	145
WINFREE, A. T., On the Photosensitivity of the Circadian Time-sense in Drosophila pseudoobscura.	159
Washing 2, 1672	
Number 2, May 1972	101
DEAKIN, M. A. B., A Model for Inversion Polymorphism.	191
ZOTINA, R. S. and ZOTIN, A. I., Towards a Phenomenological Theory of Growth	213

NEWMAN, S. A., A Source of Stability in Metabolic Networks	227
McClare, C. W. F., In Defence of the High Energy Phosphate Bond	233
Jameson, C. J. and Yang, W., Quantum-mechanical Treatment of the Electronic Structure and Geometry of Hydrogen Cyanide Dimer.	247
BOVEE, E. C. and JAHN, T. L., A Theory of Piezoelectric Activity and Ion-movements in the Relation of Flagellar Structures and their Movements to the Phototaxis of Euglena.	259
RUSSELL, C. S., Biosynthesis of Porphyrins and the Origin of the "Mauve Factor"	277
CHOU, TC., Combinatorial Analysis of Multiple Substrate-Multiple Product Enzyme Reactions	285
RUBINOW, S. I. and KELLER, J. B., Flow of a Viscous Fluid Through an Elastic Tube with Applications to Blood Flow	299
DOUTHART, R. J., Topological Constraints during Replication I. Generation of Catenanes, Circular Dimers and Higher Oligomers.	315
DOUTHART, R. J., Topological Constraints during Replication II. Complex Forms Generated by Multiple Replication Forks or Track Switching	337
LOEW, G. H., CHADHA, M. S. and CHANG, S., A Molecular Orbital and Chemical Study of Aminoacetonitrile: A Possible Prebiotic Peptide Precursor	359
Pullman, B., Coubeils, J. L. and Courrière, Ph., A Molecular Orbital Study of the Conformation of Barbiturates	375
SINHA, A. K., SMYTHE, H., ZARCONE, V. P., BARCHAS, J. D. and DEMENT, W. C., Human Sleep-Electroencephalogram: A Damped Oscillatory Phenomenon.	387
LETTER TO THE EDITOR	
HOLLAND, B. W., Dynamic Specificity and the Pairing of Homologous Chromosomes in Meiosis	395
Number 3, June 1972	
GOEL, N. S., SUBBA RAO, G., YČAS, M., BREMERMANN, H. J. and KING, L., A Method for Calculating Codon Frequencies in DNA	399

CONTENTS

YARIV, J., STEINBERG, I. Z., KALB, A. J., GOLDMAN, R. and KATCHALSKI, E., Permease as a Rotatory Carrier	459
KITTREDGE, J. S. and TAKAHASHI, F. T., The Evolution of Sex Pheromone Communication in the Arthropoda	467
SKADHAUGE, E. and KRISTENSEN, K., An Analogue Computer Simulation of Cloacal Resorption of Salt and Water from Ureteral Urine in Birds	473
Huang, HW. and Morowitz, H. J., A Method for Phenomenological Analysis of Ecological Data.	489
SILVESTER, N. R. and HOLWILL, M. E. J., An Analysis of Hypothetical Flagellar Waveforms	505
COAKLEY, C. J. and HOLWILL, M. E. J., Propulsion of Micro-organisms by Three-dimensional Flagellar Waves	525
HAN, M. H., Non-linear Arrhenius Plots in Temperature-dependent Kinetic Studies of Enzyme Reactions. I. Single Transition Processes	543
McClare, C. W. F., A "Molecular Energy" Muscle Model	569
WEISSBLUTH, M., The Jahn-Teller Effect in Hemoglobin	597
CAIRNS-SMITH, A. G., INGRAM, P. and WALKER, G. L., Formose Production by Minerals: Possible Relevance to the Origin of Life	601
Announcement	605